

Information Supplement 1 for LMS Overview workshop slides

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DRAFT

Special requirements for U.S. DoD

If you are acquiring an LMS for a U.S. DoD organization, you may be subject to Service-specific requirements. These are described in the following links:

- Navy Marine Corps Internet (NMCI)
http://www.nmci-eds.com/downloads/Gold_disk_contents.pdf
- Army Training Requirements and Resource System (ATRRS)
<https://www.atrrs.army.mil/info/sysreq.asp>
- Air Force
<http://64.233.187.104/search?q=cache:SuhSlvybkkJ:afmc.wpafb.af.mil/pdl/afmc/interg/33series/33-112/33-112in.pdf+%22Air+Force+Computer+requirements%22&hl=en>
- MarineNet
<http://www.tecom.usmc.mil/cce/references/technical/MarineNet%20Content%20Technical%20Guidelines%20Version%202.0.pdf#search='NMCI%20Approved%20Browsers%20and%20Plugins>

The information in the links above describes requirements such as:

- Security
- IT environment
- Specific use case testing
- Training gap/training needs analysis capability

One requirement that is fairly consistent across the Services is that the LMS must interface with DEERS (Defense Enrollment Eligibility Reporting System) for user verification and registration information.

Each Service often has their own training records system that the LMS needs to integrate with. For instance, the Navy often requires the LMS to integrate with NTMPS (Navy Training Management and Planning System) for personnel information and training records.

There may be particular implementation issues when installing an LMS in U.S. DoD or government, such as:

- Requirements for conducting site or pre-installation surveys

- Constraints on who can host the LMS
- Hardware, software, and firewall requirements
- Particular government contracting rules regarding setup, startup costs, vendor support, and annual maintenance agreements

See *Appendix G: Sources of Possible Requirements for U.S. DoD LMS Acquisitions* for a list of other possible sources of requirements for U.S. DoD.

Criteria for assessing quality and suitability of LMSs

The following is a list of characteristics, features, and functions that a robust LMS should include. The applicability of items in this list to your situation will probably vary widely; some items may be mission-critical for your organization and some may not be pertinent at all. You need to carefully weigh the importance of each in evaluating LMSs; rating your list of LMS candidates simply by all items in the list without weighting each item for its importance to you can lead to skewed results and a poor final choice of system.

A high quality LMS has the following characteristics:

- Registration and enrollment functions and workflow
 - Uses a straightforward, simple process for learner registration/enrollment.
 - Allows learners to auto-enroll for courses.
 - Automatically places learners in wait lists if courses are full, with automatic notification to affected stakeholders.
 - As a configuration option (where courses are not mandatory) allows students to select, register and remove courses or curricula from their course listing/learning track on their own with no supervisory or administrator intervention.
 - Displays visual interface options such as map and tree metaphors to enable clear understanding of the organization of curricula and easy course selection within them.
 - Incorporates clear navigation and search options within course catalogs to find and register for courses.
 - Allows registration and enrollment based on multiple memberships. For instance, a user is a member of the HR division but also a Level 2 supervisor; they are assigned courses based on both of these memberships.
 - Manages recurring training such that learners are auto-enrolled at the appropriate intervals.
 - Allows training managers and instructors to enroll and/or approve enrollments for learners. Approvals should have due dates associated with them.
 - Saving of sets of configurations as templates that can be applied to future courses.
 - Routes enrollment requests to instructors.
 - Intelligently manages wait-lists for courses, if enrollment is limited.
 - Links and/or enrolls learners in appropriate courses or curriculum automatically based on organizational requirements.
 - Allows setting course allotments and prioritizing learner enrollments to courses based on them.

- Includes instructor cadre management. This includes managing instructor qualifications, classes authorized to teach, and resource alerts to prevent over-booking scheduling.
- Allows administrators to easily override settings made for groups to account for particular training needs of individuals.
- Allows a variety of billing options: credit card, corporate purchase orders, departmental account numbers, etc..
- Automates tuition assistance requests and allow for supervisor and other administrative approvals of these in the system. This includes automating tuition assistance verifications after courses are completed.
- Provides the ability to print a variety of enrollment-related items, including class schedules, seat vacancies, and class rosters.
- Notifications and annotations
 - Notifies users when actions are taken in the system that affect them, both through system notification functions and by e-mail. This includes such actions as:
 - Change in user profile status
 - Change in course status
 - Confirmation of enrollment
 - Class cancellation
 - Being wait listed for a course
 - Learner dropped from class
 - Periodic reminders to attend or finish courses
 - Reminders to complete a survey
 - Sends reminders about certifications that are about to expire (so that they can renew).
 - Provides the ability to annotate and communicate actions taken, approvals, errors, etc. in regards to administrative actions, for future reference or for other administrators.
- Batch administration workflow
 - Offers batch options for tasks involving groups of system objects .
 - Allows administrators to batch register of groups of learners.
 - Allows administrators to batch set permissions and roles for users.
 - Allows administrators to batch configure courses, learning tracks, and curricula.
 - Allows time shifting of batch processes of database or processor-intensive tasks to minimize performance disruption during peak usage times.
- Prerequisite handling
 - Allows administrators to set prerequisites so that learners are evaluated for meeting prerequisites before being able to enroll in a course.
 - Can be configured to deliver pre-assessments to allow learners to “test out” if they demonstrate mastery of the material for a course.

- Includes options for configuration of waiving course/curriculum requirements based on demographic attributes other than course completion or pre-assessments.
- Establishes equivalencies so that learners can receive credit for courses and/or waive the requirement to take courses that share the same material as a course already taken.
- Content creation, importing, and configuration
 - (If it is an LCMS) Has robust content creation features (See ADL's *Choosing Authoring Tools* paper at www.ADLNet.gov for details).
 - Provides an easy, powerful, and intuitive process for importing and configuring content.
 - Provides the ability to internally create and/or configure ancillary learning objects like glossaries that can interwork with courses and apply globally to more than one course within the LMS.
 - Is interoperable with 3rd party content (if applicable). If you are delivering courses provided by a commercial provider (for example, Skillsoft or NETg), you will need to ensure that the content operates effectively within the LMS you are acquiring.
 - Imports course packages of unlimited size (especially important if your e-learning contains rich media, or courses are very long).
 - Allows elements of a course to be updated without creating a new version of the course (for instance, swapping out the SCORM manifest file without having to upload an entire replacement course package).
 - Presents options to automatically move learners to a new version of a course when a new version of it is created, or allows them to continue on the old version. This has implications for progress data; you do not want learners to lose existing progress data if they are half way through the course. For minor changes to the course, learners should be able to seamlessly experience the updated content with no interruption in their learning flow. However, for major version updates, it can be very hard for an LMS to move users to the updated content while maintaining their progress information.
- System access
 - Uses robust security architecture to maintain system access.
 - Allows learners to self-register for an LMS account.
 - Provides a single sign-on, so that users who have logged in to the enterprise intranet (through a portal, etc.) can get into the LMS without additional login.
 - Allows login to the LMS to transfer to other enterprise systems (especially HR).
 - Requires user logon only once per LMS session.
 - (for high-security government installations) Uses Common Access Card (CAC) access.
 - Incorporates appropriate security certifications and standards, and features (see 5.5. *Security considerations for LMSs* and 5.8. *Special requirements for U.S. DoD*). Other security standards you may need include SSL, PKI, and FIPS – 140-1.
- Permissions and roles
 - Defines a wide variety of permission and role levels that are applicable to a range of organizational structures and use case scenarios for the system.
 - Restricts course enrollment to pre-authorized learners.

- Uses templates to easily set group permissions.
- Restricts access to functions for individual courses based on membership on teams associated with that course.
- Allows delegating permissions for users at a lower level of permission than what one is logged in as.
- Allows creation of subgroups that inherit permissions of parent groups.
- Can be set so learners are anonymous to each other, instructors, and administrators.
- Offers “organization aware” features that allow administration based on external data feeds concerning organization roles and permissions.
- Supports mirroring an organizations structure in the database to manage students, supervisors and approvers based on where they exist within the organizational structure.
- Features levels of permission corresponding to clearly defined levels of administrative responsibility. For example:
 - Level 1. - Overall responsibility for system
 - Level 2. - Database Administration
 - Level 3. - Maintenance administration of the system. This permission may be segmented to allow users only to perform particular maintenance tasks or for particular user groups.
 - Level 4. – Curriculum administration. This permission may be segmented to allow users only to perform particular tasks for certain curricula and/or with certain groups of learner.
 - Level 5. – Content administration (this permission may be segmented to allow users only to perform particular tasks on particular courses)
 - Level 6. - Authoring capabilities (for LMSs that have this function)
 - Level 7. - Learner
- System performance
 - Performs with minimal latency under a variety of use case scenarios and load conditions.
 - Handles large numbers of concurrent users.
 - Handles user load efficiently, provisioning and scaling resources to smoothly accommodate fluctuations (especially spikes) in numbers of concurrent users.
 - Works equally well (all functions, including course delivery) on all standard Internet browsers.
 - Has reasonable system requirements that are attainable within your organization.
- Course catalog database
 - Provides a single, integrated or multiple course catalogs whose overall and internal organization can be flexibly defined by a variety of characteristics.
 - Does not arbitrarily limit the number of levels, items, or sizes of items included in the catalog of courses delivered or imported.
 - Contains a course catalog including many details of courses, especially:

- Objectives
- Credits
- Course #
- Cost
- Associated career track(s)
- Associated competencies
- Delivery method
- Prerequisites
- Functional area
- Location (if synchronous)
- Job skill
- Product line
- Subject
- Associated resources
- Seat time
- Provides search capability, including by all of the above in addition to keyword.
- Provides the ability to search for text within courses.
- Can be linked dynamically to external catalogs (for instance, from COTS content providers).
- Can be updated with release updates and additional courses from external sources.
- Provides version control and other management functions for course updates.
- Interface customization
 - Allows visual branding of the interface for all users in the enterprise.
 - Allows use of skins to visually brand the LMS dynamically according to the role, organizational membership, or other parameters of the individual user who is logged in.
 - Allows toggling display of the LMS Table of Contents (TOC) for a course, so that courses with no need for this (for example, courses with just one SCO) vs SCORM courses with many SCOs (and thus a need for good inter-SCO navigation).
- Standards and language support
 - Supports the current and all required legacy versions of relevant standards such as SCORM. See 5.10: *Standards support* . For details on what is required for full SCORM support, see www.ADLNet.gov.
 - For SCORM content:
 - Is certified at the level of your content, or has been tested for conformance. Do not rely merely on vendor advertisements of their conformance.
 - Retains visibility for the TOC when a SCO has been launched.
 - Shows both “attempted” status as well as “completion”

- Complies with Section 508 requirements for system interfaces.
 - Supports multi-byte (Unicode) fonts (esp. Asian language characters).
 - Offers flavors of the interface in foreign languages.
- Training infrastructure and performance analysis
 - Includes the ability to enter and capture such items as course development costs.
 - Provides support for student surveys and training needs surveys.
 - Includes training budget/cost tracking and projecting features that stores and reports (by learner, course, organization, year, etc..) such items as:
 - Budget authorizations
 - Funds allocated
 - Funds still available
- Learning object management
 - Allows attaching, associating, and consolidating diverse content pieces into a single course (for example, core course content delivered as e-learning with auxiliary PDF and video resources included separately).
 - Includes ways to link content and assignments in blended learning courses so that it is clear that the components are part of a single course and can be assessed and tracked as such.
 - Is optimized for reusability in general (not just measured by SCORM support). Some LMSs have their own internal content repository that allows internal mixing and matching of objects in designing a course, curriculum, or learning track.
- Delivery architecture
 - Supports a wide variety of delivery architectures. For instance, an e-learning architecture involving a content repository that may be on a different server than the LMS and is supplied by another vendor.
 - Can be configured (via proxy server, etc.) to avoid the cross domain scripting issue so that courses not residing in the LMS domain can be launched. This includes launching courses from content repositories in different locations within the corporate intranet, as well as on the Internet.
 - Can provide an audit trail for required deployments of mandated training (for example, compliance training).
 - Allows delivery of a wide variety of content in diverse file formats for delivery to learners as either embedded into the e-learning or separate learning objects.
 - Has offline player capabilities (see 5.4. *Offline player capability*).
 - Offers a browse mode whereby testing requirements are suspended (for learners who have already taken the course). This may be handled through content functions or standards like SCORM.
 - Launches courses cleanly and easily, regardless of their source, (COTS or Gov't developed, LMS server or other server).

- Includes configuration management and version control features for content. This includes, for example, checking files in and out to prevent accidental overwriting, and revision tracking to audit changes and roll back to earlier versions.
- Supports delivery to mobile devices.
- Permits bookmarking locations in courses and other content and storing favorites to particular screens in the LMS.
- Includes a user system requirement checker that tests learner systems for appropriate plugins (and versions) before courses are launched. The LMS should not allow you to launch content unless it passes the test.
- Opens a minimum of windows to deliver courses. Some LMS's open chains of 3 or 4 browser windows just to deliver a simple course. If the user inadvertently closes one of these windows, it can be possible for the course to stop functioning.
- Cost
 - Costs less for the base application license compared to the cost of other similar systems with similar capabilities and feature sets. This includes all TCO (total cost of ownership) costs.
 - Has a licensing agreement that is flexible and easily scalable to reflect changing numbers of learners and administrators.
 - Costs less for recurring and ongoing support compared to the cost of other similar systems.
 - Costs less for the database (if included separately) compared to the cost of other similar systems.
 - Is projected to cost less for required customizations compared to the cost of customizations for other similar systems.
 - Costs less for add-ons such as APIs to external applications compared to the cost of other similar systems.
 - Offers hosted and/or SaaS solutions to take advantage of these potentially cost saving options (see 5.6 *Hosted solutions* and 7.10 *SaaS* for details).
 - Costs minimally extra for separate test and staging instances of the product (see 5.9. *Test and staging environments*).
- Assessment authoring
 - Provides an internal function to create and deliver a wide variety of assessment types (with template options). See 5.11. *Internal assessment authoring* for more details.
 - Can export assessments created within the LMS for use in other content or LMSs. Assessments created in the system must be interoperable (using a standard like the SCORM cmi.interactions data element) in order for this to happen.
 - Includes a grade book function for instructor-led courses.
 - Provides a rating or assessment function for mentor/coach/OJT assessments.
 - Allows input/upload and management of essay questions.
 - Can be configured to remediate students to particular content or locations in content based on assessment results.

- Allows importing sets of questions formatted in a standardized format.
 - Randomizes the order of questions within an assessment and the answers within a question.
- Mentoring, coaching, and other developmental scenarios
 - Supports management (assigned on an individual or class basis) of:
 - Mentoring
 - Coaching
 - OJT
 - Shadowing and apprenticing
 - Rotational assignments
 - Career programs
 - Conferences/forums/seminars/workshops
- Collaboration and communication options
 - Includes collaboration functions to enable users to communicate with each other, instructors, course administrators, system administrators, etc. These functions typically include:
 - Email
 - White boarding
 - Chat
 - File sharing
 - Threaded discussion
 - Desktop sharing
 - Provides specific functions that enable learners to provide feedback on the content.
 - Provides a variety of asynchronous distribution mechanisms for content, including email attachments, RSS feeds, and podcasts.
 - Includes online conferencing capability (this is standard for VLEs, but not for LMSs).
 - Includes logistical communication functions such as a course calendar and learning assignment pages. Calendars should filter items for relevancy to the role of the person logged in.
 - Effectively manages authorization/authentication- manages access to materials and conferences.
 - Provides social media learning functions that can be integrated into the curriculum to provide social media-based learning assignments. See 7.2 *Support and optimization for social media* for more details.
- Competency management and development/learning plans
 - Supports competency management and IDP HR enterprise infrastructures.
 - Automatically links training interventions and competency objects based on user approval.

- Features advanced natural language matching algorithms and associated linking functionality.
- Maps individuals/groups to a course/curriculum dynamically based on rule sets established based on enterprise requirements.
- Operates as a standalone product, so that linking training interventions to competency objects can be performed off-line and then ported to the LMS.
- Uses a variety of competency frameworks, providing a range of choices for methods of measuring competencies (for example 360-degree Feedback).
- Uses a variety of competency rating scales.
- Includes built-in Update functions to reconcile linkages due to changes in training interventions or competency objects (additions, deletions, or just word changes).
- Imports/exports competency-related data in common database formats such as XML or MS Access.
- Can provide IDP progress, training completion, and other related input to competency management, performance appraisal and other HR components of other systems.
- Can provide automated analysis/assessment survey of employee's current and anticipated skills and competencies. Gaps are identified with appropriate courses indicated to address closure of gap(s).
- Prioritizes competencies and courses based on changes in career, regulations, funding, or organizational vision/mission.
- Prioritizes competencies and courses based on changes in career, regulations, funding, or organizational vision/mission.
- Can import competency inventories and rubrics as well as learner data from external systems.
- Supports individual learning plans (IDPs) with the following options:
 - Dynamic IDP that is updated as employee registers, attends, completes, or does not complete approved training.
 - Certification/recertification schedules and notification.
 - Competency decay refresher.
 - Mandatory/optional training requirements.
 - Ad-hoc/emergent training requirements.
 - Full reporting capability.
 - Compatibility with any competency framework.
 - Compatibility with any competency rating scale.
 - Performance thresholds (times to complete).
- See 7.9 *Competency analysis tools* for more details on competencies.
- Learner tracking
 - Capable of tracking, reporting and storing a wide range of student performance data by individual, by group and by cohort groups.

- Includes the ability to add custom fields to track additional learner information, so that they can be included analyses and reports.
- Tracks accredited learning units, for instance, continuing learning units (CLUs), continuing education units (CEUs), and continuing professional education (CPEs).
- (for government installations) Includes the ability to "federalize" data to store SSNs (encrypted), name, CPOID, Activity, Organization, Pay Plan ,Occupational Series, Grade and other identifying government information.
- Provides the ability to print a variety of tracking-related items, including test scores.
- Can track a wide variety of relevant items, including:
 - Enrollments
 - Withdrawals
 - Launches
 - Completions
 - Use of materials
 - Evaluations
 - Grades
 - Assessment scores
- Allows a learner to view their own online course results on a lesson by lesson basis as well as:
 - Time spent
 - Date and time last accessed
 - Number of test tries
 - Course grade
- Certificates, forms, and surveys
 - Allows administrator design/upload and learner delivery of course completion certificates.
 - Includes electronic signature capability on external form(s), for example, the government SF-182. Signature features for government installations should include SSL, PKI, and encryption for all authorizing levels.
 - Allows easy printing certificates, surveys, and evaluations.
 - Provides survey functions as follows:
 - Create and edit
 - Copy
 - Define properties
 - Preview
 - Define survey link location (for embedding survey in eLearning, website, sending by email, etc.)

- Interfaces with external systems and applications
 - Interfaces with a wide variety of HR and enterprise resource planning (ERP) systems (this may be an additional cost) such as SAP®. Data should import and export to HR systems in real-time and batch mode. This data typically includes not only student demographics and identification but but such things as competencies, certifications, and IDPs (individual development plans).
 - Enables add-ons and integration using an open architecture (see 7.3 *Open architectures* for more details).
 - Interworks with other systems that manage and deliver training, including LMSs (especially if you will need to deliver courses that are resident on another system).
 - Has the ability to call external applications and code objects (such as calculators and random number generators), and set up interfaces to read and write from databases.
 - Is interoperable with a variety of authoring tool(s), including direct import from the authoring tool into the LMS.
 - Includes “widgets” (add-ons) that allow the learner to access search engines, maps, social media sites, etc..
 - Includes automatic student registration of new hires based on data that is input to HR system.
 - Links to employee records in the external system.
 - Deletes student ID and training records when employees terminate based on action in the external system.
- Metadata support
 - Supports the kind of metadata your organization uses (LOM, Dublin Core, etc.). See 5.10.4 *Standards for metadata* for more details.
 - Includes a convenient mechanism for adding metadata or descriptive labeling to not only courses, but other objects (SCOs, files, activities, etc.).
 - Uses metadata to search the course catalog(s).
 - Presents options for display of metadata to learners and administrators at relevant nodes in their workflow.
- User profiles
 - Has the ability to manage profiles for organizations, not just users.
 - Has the ability to matrix learner characteristics demographically, organizationally, etc. (for example, assign students to more than one job role, in more than one organization).
 - Can be searched on any field.
- Reports
 - Offers a wide variety and number of predefined reports.
 - Offers flexible, robust abilities to create custom reports, both internally and by using external tools (including those supplied by other vendors such as Crystal Reports®).
 - Prints reports easily, with appropriate options.
 - Provides capabilities to:

- Administer and maintain performance and evaluation metrics.
 - Track individual and group usage statistics.
 - Integrate evaluation forms internal and external to the courses.
 - Perform statistical analysis on the database information.
 - Report on learner performance data by individual and group.
- Provides direct access to tables used within the LMS for developing queries and reports. This should be documented in table and data structure specifications provided with the product. This is usually a requirement for government installations.
- Ease of use for administrators
 - Is easy to learn and use, with the ability for users to choose from tiers of features according to the knowledge and expertise of the user. This allows users to start using the program quickly and gradually progress to more complex authoring tiers/feature sets as their skills mature. In other words, users only see features that are relevant to their level of skill and the kind of operations they are capable of performing.
 - Provides user interface customization (not on the level of tiers of features, as above, but on an individual feature basis), so that both learners and administrators can optimize for their particular needs.
 - Is easy to install and reconfigure.
 - Manages the administration process efficiently with built-in workflows (for approvals, for instance).
 - Administrative interfaces are clear, simple, and optimized for usability. Administrator interfaces are no less important than learner interfaces. Just because learner interfaces are well-designed does not mean the administrative interfaces will be also(!) This is particularly important where there is a need for non-technical staff to perform administrative functions (such as for instructors to pull reports and configure courses).
 - Includes options for remote administration from outside the enterprise intranet (through the Internet) and possibly via a handheld device.
 - Provides features that allow administrators to view role structures in a graphical representation (diagrams, outlines, etc.).
 - Provides clear, specific error messages that aid in troubleshooting. A generic message that is the same for all errors is not acceptable. You also want to avoid cryptic, technical messages that can only be interpreted by the LMS's software developers. Messages should be understandable not just by technically inclined LMS administrators, but also content developers. Also, it is ideal for error messages to vary depending on whether you are in the test vs. the production system.
- Ease of use for learners
 - Displays interfaces that are consistent and standardized throughout all screens.
 - Uses straightforward, simple, and intuitive paths for performing administrator and learner job task functions. You should test your most common and important use cases on the system to verify this.
- Transcripts and other documentation

- Allows learners and administrators to print transcripts, course completion certificates, and student records with appropriate options.
- Allows a learner to be able to view a transcript of all training that has been recorded in the LMS for their account along with status and status date.
- Scalability
 - Has a scalable architecture that allows the system to expand as the number of users increases. The following factors should be taken into account in your planning:
 - Number of concurrent users (current and in the foreseeable future)
 - Database licensing (by seat or site)
 - Database volume restrictions
 - Has a scalable architecture, enabling evolution of the client installation without forcing them to go through frequent major version upgrades.
- Vendor characteristics
 - Has a good reputation among acquisition and system owner communities. Ask the vendor who their other clients are, what they use the system for, and see if you can talk to these clients about their experience using the system.
 - Has been in the LMS market for at least 5 years. Avoid the first release of a new system.
 - Has a clear roadmap with a reasonable time frame for new versions and additions of new features.
 - Listens to your concerns during interactions with them, especially during demo sessions of their product. How they are in these situations probably reflects how responsive and attentive they will be to your concerns as a customer.
 - Is financially sound and not in danger of going bankrupt.
 - Is not a small organization with few employees and thus unstable.
 - Is not about to be acquired or merged with another vendor.
 - Has worked with many content developers using a variety of different kinds of content. Ask for references at organizations that have implemented content similar to yours.
 - Is International Standards Organization (ISO) and/or Capability Maturity Model Integration (CMMI) certified to ensure high-quality software development output.
- User training, support, and documentation
 - Has robust support documentation in a wide variety of forms including tutorials, help, examples, references, and user manuals.
 - Has a variety of Help desk support options for administrators and learners (telephone, chat, email, etc.).
 - Has a Help Desk system that is structured and process driven via trouble call tracking and reporting.
 - Has Help Desk support that coordinates problem resolution with the appropriate parties: vendors, SME's, etc. for problem resolution.
 - Has knowledgeable, experienced support personnel.

- Is available as close to 24/7 and world-wide as possible.
- Offers extensive training options: e-learning, video tutorials, ILT sessions, webinars, etc..
- Has onsite training options. If training is at vendor site, the location (s) are a reasonable distance.
- Includes an orientation tutorial for new users.
- Has a low average turn-around time for help-desk support.
- Has a feedback function for suggestions on improving the LMS.
- Provides technical consulting services options for customizations, implementation, configuration, architecture design, needs analysis, change management services, etc.
- Media and content support
 - Provides support for industry-standard streaming protocols for audio and video.
 - Supports immersive learning content. See *17.2 Support and optimization for immersive learning technologies* for more details.
 - Supports a wide variety of media (see below) and media file formats. Examples include:
 - Audio
 - MP3
 - RealAudio
 - WAV
 - Video
 - MPEG-4
 - RealVideo
 - Quicktime
 - AVI
 - Documents
 - Microsoft Office
 - Adobe PDF
 - Graphics
 - JPEG
 - PNG
 - GIF
 - 2D animation
 - SWF
 - HLA Simulations
 - 3D animation
 - SWF

Examples of LMSs Used in the Federal Government and Social Media Integration

The following is a list of five LMSs commonly used in the Federal government and their level of integration of social media.

LMS	Sample List of Integrated Social Media	Purpose of Social Media Integration	Challenges Perceived by Vendor to Adoption of Social Media
Meridian KSI	<ul style="list-style-type: none"> • Online communities • Blogs 	<ul style="list-style-type: none"> • “Learning First” approach • Traditional LMS • Facilitate Communities of Practice 	<ul style="list-style-type: none"> • Serious Use • Perceptions
OutStart	<ul style="list-style-type: none"> • Communities • Blogs • Wikis • MS Office • Email 	<ul style="list-style-type: none"> • Informal Learning Enabled • Talent Management 	<ul style="list-style-type: none"> • Lifecycle Management Issues • Tracking
Plateau	<ul style="list-style-type: none"> • Available through Virtual Learning System • Multimedia content • Application demos • VOIP • Real-time Collaboration technologies from Adobe Connect Pro, WebEx, LiveMeeting, & Centra 	<ul style="list-style-type: none"> • Talent Management • Learning Management 	<ul style="list-style-type: none"> • Integration • Timely accessibility to information
Saba	<ul style="list-style-type: none"> • Wiki • Communities of Practice • User-generated content capture and exchange • Discussion forums • RSS • Search-based learning • Real-time Collaborative capability (web- 	<ul style="list-style-type: none"> • Learning Management • Talent Management 	<ul style="list-style-type: none"> • Organizational Control (culture) • Quality/Accuracy

LMS	Sample List of Integrated Social Media	Purpose of Social Media Integration	Challenges Perceived by Vendor to Adoption of Social Media
	conferencing, e-meetings, & virtual classes)		
SumTotal	<ul style="list-style-type: none"> • Collaborative Web 2.0 Learning solutions • Online Communities • Discussion forums • Mobile access • Integration with SkillSoft, WebEx™, Interwise® and Centra® • Capture and categorize virtual events for use as job aids or information modules 	<ul style="list-style-type: none"> • Learning Management • Talent Management 	<ul style="list-style-type: none"> • Organizational Control (culture) • Quality/Accuracy

Sources:

http://www.usalearning.gov/USALearning/service_golearn.htm

<http://www.brandon-hall.com>

Examples of Virtual Worlds Used in the Federal Government that Feature LMS Integration

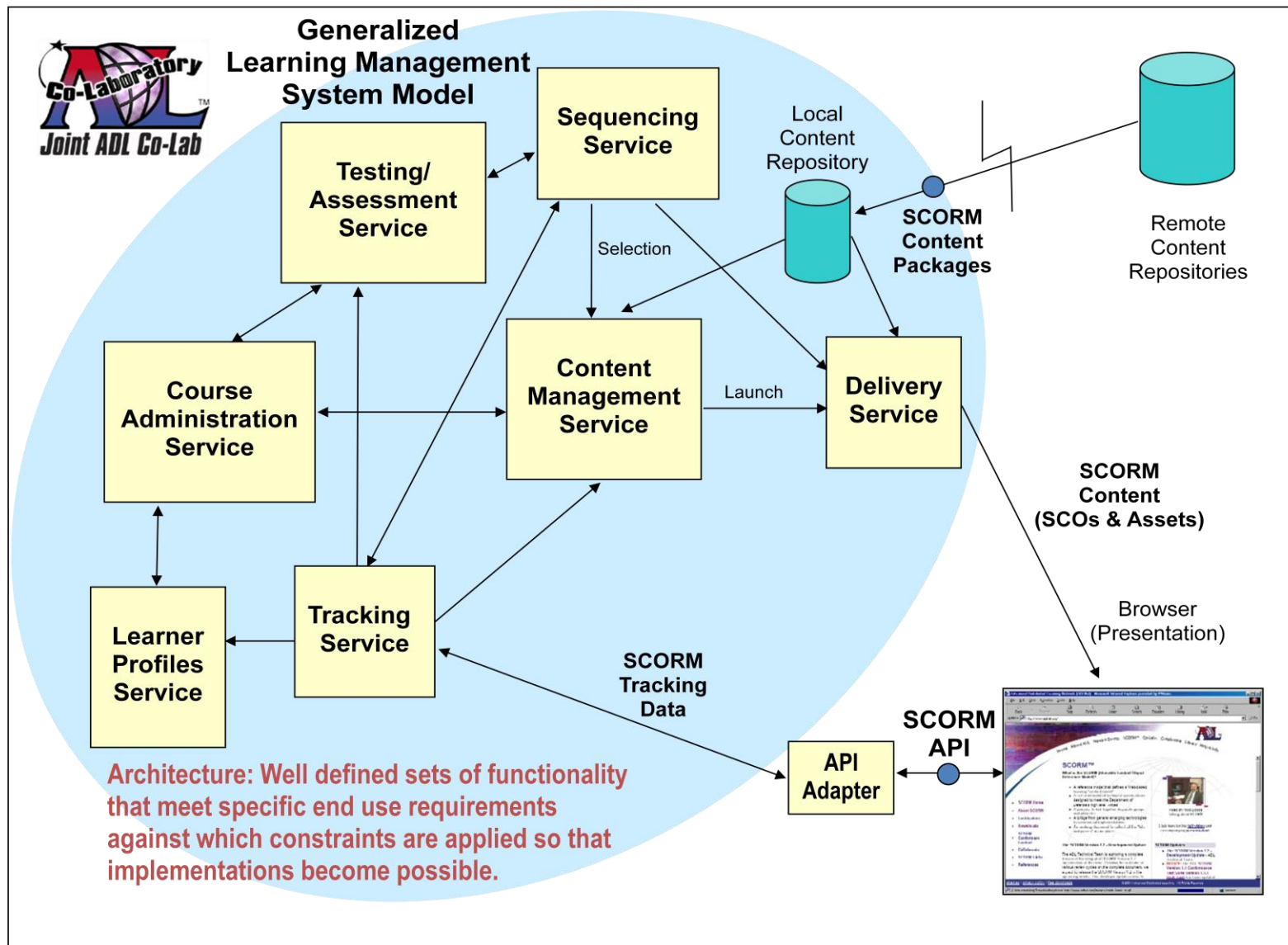
The following is a list of five virtual worlds (VWs) commonly used in the Federal government that integrate with LMSs.

VW	VW Description	Purpose of VW	Challenges Perceived by Vendor to LMS Integration
ECS Nexus	<ul style="list-style-type: none"> • 3D environment • Avatar-based, interactive meeting environments • Massive Multi-User Online Environment (MMOE) 	<ul style="list-style-type: none"> • Commercial collaboration & training • Government collaboration & training 	<ul style="list-style-type: none"> • Tracking • Adoption • New Pedagogies
Forterra	<ul style="list-style-type: none"> • 3D environment • Avatar • Collaborative Meetings • Training & Learning • Events • Specialized Applications 	<ul style="list-style-type: none"> • Commercial collaboration & training • Government collaboration & training • Higher Education collaboration & training 	<ul style="list-style-type: none"> • Metrics • Integration
Protosphere	<ul style="list-style-type: none"> • 3D environment • Avatar • Secure Communication • Built-in Social Network 	<ul style="list-style-type: none"> • Commercial collaboration & training • Government collaboration & training • Higher Education collaboration & training 	<ul style="list-style-type: none"> • Integration • Tracking • Perceptions
Qwaq	<ul style="list-style-type: none"> • Scalable architecture • Secure, flexible, and extensible • Software as a Service (SaaS) • Qwaq Multi-Share • Built-in data encryption • Open standards 	<ul style="list-style-type: none"> • Commercial collaboration & training • Government collaboration & training 	<ul style="list-style-type: none"> • Learning Curve • Tracking • Integration

VW	VW Description	Purpose of VW	Challenges Perceived by Vendor to LMS Integration
SecondLife (integration with Moodle is called "Sloodle")	<ul style="list-style-type: none"> • In-world commerce • APIs to customize desired capabilities/features • Service metrics • Open source 	<ul style="list-style-type: none"> • Social collaboration • Multi-sector marketing, training & education 	<ul style="list-style-type: none"> • Tracking • Security • Interoperability
Vastpark	<ul style="list-style-type: none"> • Not a single virtual world. Instead, it provides free software tools, APIs and open source libraries so you can deploy (and even monetize) your own virtual worlds and add-ons 	<ul style="list-style-type: none"> • Commercial collaboration & training • Government collaboration & training • Higher Education collaboration & training 	<ul style="list-style-type: none"> • Integration • Tracking

Sources: Information gleaned from vendor web sites, conference presentations, workshops, and discussions.

Diagram of Generalized LMS Architecture (including SCORM Elements)



Security Considerations for DoD LMSs

The following are security considerations and requirements for any LMS that will be used within U.S. DoD. Many of these considerations apply in a more general sense to any military environment that is acquiring or installing an LMS.

- Unclassified system (NIPRNET)
- Classified system (SIPRNET)
- Certification requirements
- Customer databases
 - Defense Enrollment Eligibility
<http://usmilitary.about.com/library/milinfo/dodreg/bldodreg1341-2i.htm>
 - Reporting System
<http://usmilitary.about.com/library/milinfo/dodreg/bldodreg1341-2i.htm>
 - Army Knowledge Online
<http://www.army.mil/ako/>
 - Navy Knowledge Online
<https://wwwa.nko.navy.mil/portal/home/>
 - Navy Training Management Planning System
<http://www.ntmps.navy.mil/>
 - Air Force Knowledge Now
<http://www.defensetechbriefs.com/>
- Security Certification & Accreditation
<http://www.dtic.mil/whs/directives/corres/pdf/850001p.pdf>
- Transport Layer Security (TLS)
http://en.wikipedia.org/wiki/Transport_Layer_Security
- Public-Key Infrastructure (PKI)
<http://www.dartmouth.edu/~deploypki/overview.html>
- Federal Information Processing Standard (FIPS – 140-1)
<http://www.cerberussystems.com/INFOSEC/stds/1401ig.htm>
- Support for multiple levels of customizable security access
- Mobile Code Use in the Military
<http://www.defenselink.mil/nii/org/cio/doc/mobile-code11-7-00.html>
- Security System Authorization Agreement – Required by DoDI 5200.40 - DoD Information Technology Security Certification and Accreditation Process (DITSCAP)
<http://iase.disa.mil/diacap/i520040.pdf>

Sources of Possible Requirements for U.S. DoD LMS Acquisitions and Installations

- DoD 5220-M-SUP - National Industrial Security Program Operating Manual Supplement Feb 1995
<http://www.dtic.mil/whs/directives/corres/html/522022ms.htm>
- DoD 5220.22 - DoD Industrial Security Program Dec 08, 1980
<http://www.dtic.mil/whs/directives/corres/html/522022.htm>
- DoD 5220.22-M - National Industrial Security Program Operating Manual Jan 1995
<http://www.dtic.mil/whs/directives/corres/html/522022m.htm>
- DoD 8510.1-M - DoD Information Technology Security Certification and Accreditation Process (DITSCAP) Application Document Jul 31, 2000
http://www.dtic.mil/whs/directives/corres/pdf/85101m_0700/p85101m.pdf
- DoD 8910.1-M - DoD Procedures For Management Of Information Requirements Jul 11, 1993
<http://www.dtic.mil/whs/directives/corres/html/89101m.htm>
- NSTISSI No. 4009 - National Information Systems Security (INFOSEC) Glossary May 2003
<http://www.nstissc.gov/Assets/pdf/4009.pdf>
- OMB A130 Transmittal Number 4 - Management of Federal Information Resources Various
<http://www.whitehouse.gov/omb/circulars/a130/a130trans4.html>
- Public Law 100-235 - Computer Security Act of 1987 Jan 8, 1988
<http://www.nist.gov/cfo/legislation/Public%20Law%20100-235.pdf>
- Subsection 552a of title 5, United States Code - Subsection 552a of title 5, United States Code Jan 06, 2003
http://law2.house.gov/uscode-http://www.law.cornell.edu/uscode/5/usc_sec_05_00000552---a000-.html
- DODD 8500.1 Information Assurance
<http://www.dtic.mil/whs/directives/corres/html2/d85001x.htm>
- National Security Telecommunications and Information Systems Security Instruction (NSTISSI) No. 4009, "National Information Systems Security Glossary," September 2000
<http://www.dtic.mil/whs/directives/corres/pdf2/p52001r.pdf>
- DoD 5200.1-R, "DoD Information Security Program Regulation," January 14, 1997
<http://www.dtic.mil/whs/directives/corres/pdf2/i520040p.pdf>
- DoD Instruction 5200.40, "DoD Information Technology Security Certification and Accreditation (C&A) Process (DITSCAP)," December 30, 1997
- 44 U.S.C. § 3541, United States Code, "Federal Information Security Management Act of 2002" (FISMA)

Update on the SCORM Certification Program for LMSs

As of this writing, ADL is planning changes to the certification process for LMSs (projected for January 2010). ADL decided that the process in the past was not rigorous enough. The process was made easier in order to foster adoption of the SCORM standard, but that caused problems. ADL did not restrict the certification designation to apply only to the particular version of the LMS software that was originally tested. Situations arose where upgrades and patches to the LMS software compromised the LMS code that supported SCORM. Thus, “SCORM certified” became meaningless for content developers whose SCORM conformant content no longer ran in the system, since certification actually only represented a point in the lifecycle of the software and never expired throughout changes to the system.

Under the new certification program, LMSs will be revalidated throughout the product life cycle. This is part of ADL’s plan to make the certification process more robust, aligning it with the ISO standard for certification. Certified LMS vendors will be obligated to self-test their system after each dot release, sending the test log to ADL to prove that their SCORM module hasn’t broken. For major releases, the vendors must recertify the system.

Other parts of the plan include:

- The ability for external entities to challenge the certification of an LMS, if content that is tested to be SCORM conformant does not run on a SCORM-certified LMS. The challenge process will force the vendor to demonstrate that the system is still compliant by submitting ADL SCORM Conformance Test Suite logs. If they are indeed compliant, ADL will upgrade the Test Suite and Sample Run Time Environment (SRTE) to account for the anomalous behavior in the content.
- A decertification process will be defined, in cases of egregious violations of the certification program terms and condition.
- ADL will issue guidelines on how the ADL logo can be used by certified entities.

In addition to these changes, ADL will institute an optional program to participate in the ADL Learning Technology Lab. Vendors can contribute their certified system to the lab to enable ADL to test and demonstrate their system, under the condition that they have to keep sending their updates to ADL.

Benefits of participation in the Learning Technology Lab will include:

- Vendors don’t have to provide logs to prove that they are maintaining certification through dot releases, custom installations, patches, etc. ADL will do this on the system in the Learning Technology Lab.
- ADL will provide the resources and logistical support to handle certification challenges (as described above)
- Vendors can occupy a space on ADL Learning Technology Lab portal, which has obvious marketing advantages.